

Distribution and physiological state of microorganisms in petrochemical oily sludge

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Abstract

The occurrence, vertical distribution, and physiological state of microorganisms in a petrochemical oily sludge deposit were studied. The total number and the number of viable microbial cells at depths of 0.2 and 3 m were about 10¹⁰ and 10⁸ cells/g dry wt sludge. Most microbial cells taken from the middle (1 m deep) and the bottom (3 m deep) sludge horizons showed a delayed colony-forming ability, which suggested that the cells occurred in a hypometabolic state. The relative number of microaerobic denitrifying microorganisms steeply increased with depth. The amount of microorganisms tolerant to 3, 5, and 10% NaCl and capable of growing at 7 and 40 °C varied from 10² to 10⁸ CFU/g dry wt sludge. Petrochemical oily sludge was found to maintain the growth of heterotrophs, among which the degraders of oily sludge and ten different individual polycyclic aromatic hydrocarbons were detected. The occurrence of highly adaptable microorganisms with an adequate metabolic potential in the petrochemical oily sludge deposit implies that its bioremediation is possible without introducing special microorganisms.

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Keywords

Bioremediation, By-products, Microflora, Oily sludge, Petrochemistry, Physiological state, Tolerance